FOCUS

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ALICE TAYLOR, EDITOR

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U.S.S.R. Resources: I—*Heavy Industry*

To realize just how vast the Soviet Union is, let us remember that it is three times the size of the United States, is larger than the whole of North America, and covers one-sixth of the continental surface of the globe. The northernmost tip lies close to the North Pole; the southernmost border touches far-off Iran and Afghanistan. The greatest east-west distance is more than 6,000 miles. When it is noon on the Polish frontier, it is 11 P.M. on the shores of Bering Strait; by way of comparison, when it is noon in San Francisco, it is only 3 P.M. in New York City. On the basis of its size alone, one might venture to guess that the Union's total resources are immense.

Twenty-five years ago the Soviet Union was mainly an agricultural country. Its power and mineral resources had barely been touched. The basic aim of the Soviet régime, as expressed by Stalin in 1925, was to transform this agrarian state into an industrial giant—as quickly as possible. First, the government socialized all means of production, and then initiated (in 1928) a succession of Five-Year Plans, all of which have stressed the development of industry, particularly heavy industry.

Undeniably the Soviet Union has made spectacular gains in this respect. Production of both coal and steel —the two most important elements in heavy industry —has multiplied nearly ten times during this period; the Union has risen from a minor position to second rank in the world today. If the same percentage rates of increase were to continue for the next quarter of a century, the Soviet Union would produce more coal and steel than all the rest of the world! This is unlikely, of course.

In 1928, Soviet coal output was only 34 million metric tons, less than one-tenth that of Germany and the United Kingdom together; by 1953 it had risen to 320 million metric tons, nearly equal to the combined total for these two highly industrialized countries, and not far below the output of the United States (440 million metric tons).

In 1928, the Soviet Union produced 4 million metric tons of steel, less than one-fifth as much as the United Kingdom and Germany together; in 1953 it succeeded in producing 38 million metric tons, about 15 per cent more than the combined efforts of these two countries. It still has a long way to go, however, before reaching the United States level, which stood at 101 million metric tons in 1953.

What special conditions have made possible this stupendous growth in Soviet heavy industry?

First of all, it should be noted that such an explosive expansion is not unique. The United States underwent a similar period of rapid development some time ago; the increase in amount of production

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that the Soviet Union has achieved in 25 years took but a little longer in the United States.

Secondly, Soviet heavy industry has been able to borrow technology from the West and thus has largely bypassed a period of slow experimentation.

Thirdly, the government has had the power to determine economic policies. By severely limiting expenditures for food, clothing, and shelter, it was able to concentrate investment and labor on heavy industry, and thereby achieved a world record in rate of expansion: the rate of growth of the total economy is another matter and is not here considered. By heavy taxation the government accumulated vast funds for industrial investment, and two-thirds of this investment was devoted to heavy industry.

Agriculture, milked by the government, stagnated. The standard of living suffered; according to a recent American study, real wages in the Soviet Union declined precipitately during the early Five-Year Plans and only now are once again approaching the level of 1928. The amount of housing in cities is reported to have decreased from 64 square feet of floor space per person in 1928 to 46 square feet in 1953. The *average* urban family of five has a one-room apartment 12 by 19 feet. Consumer and light industries were utterly neglected.

The long-range possibilities for continued Soviet expansion of heavy industry depend on many factors, such as the size, skill, and motivation of the labor force, technology, capital in the form of installed facilities for production and transportation, financial resources, management, market, and general economic development. We shall here concern ourselves, however, only with the basic natural resources of energy and metals. One provides the power and the other the tool through which the power is applied. But first we need to make clear certain principles.

Known mineral resources do not set ultimate limits. Many reserve figures are little more than working inventories. As known deposits are exhausted, more intensive effort may locate new ones. Furthermore, the technology of mineral exploration and exploitation is improving all the time. Secondly, shortage of a single raw material is rarely critical. Other materials can generally be substituted. Thirdly, the Soviet Union has demonstrated a remarkable ability to limit consumer consumption when it so wishes.

The total energy resources (fuel and water power) of the Soviet Union are estimated to constitute 23 per cent of the total world resources (as compared with 29 per cent for the United States). According to these estimates, the United States and the Soviet Union together have more than half the energy resources of the entire world.

The areal distribution of Soviet energy resources, however, is in general unfavorable. Most of the people live in the European part of the Union, but 90 per cent of both the coal and the water-power resources lie in the Asiatic part. This maldistribution may be one reason why the government has encouraged, and even forced, an eastward migration of population and industry.

A very large proportion (94 per cent) of Soviet fuel reserves are in the form of coal; peat represents only 4 per cent, and all other fuels (petroleum, natural gas, and oil shale) merely 2 per cent. Coal provides about 70 per cent of the energy currently produced, petroleum and fuel wood most of the rest. We shall here consider only coal, petroleum, and water power.

Soviet coal reserves, estimated at the astronomical figure of 1,650,000 million tons, are sufficient to meet the foreseeable needs of the country for many centuries to come. Of the major producing fields—the Donets, the Kuznetsk, the Moscow Basin, the Urals, and Karaganda—the Donets Basin has by far the best location in respect to markets of all the deposits of high-grade coal. Probably because of this, it has been the largest producer since the rise of modern coal mining, even though it possesses only 5 per cent of the reserves. Before World War II it was producing considerably more coal than all the other fields together. Its proportion has now dropped to about one-third of the total, but its actual output has climbed to 100 million metric tons (about the same as the bituminous-coal production of Pennsylvania).

The Kuznetsk Basin, the second most important field, has the largest reserves of good-quality coal in the Union, and, among the Siberian fields, it has the best location, best quality, and largest proved reserves. The locational handicap of Soviet coals is well illustrated by the fact that Kuznetsk coal is shipped to Central Asia and to the Urals, both about 1,500 miles away. In so long a journey 40 per cent of the coal is consumed in its own transportation.

The Moscow Basin and some of the Ural basins produce lignite rather than bituminous coal, but production increased sharply during and after the war because of their proximity to major markets. The Karaganda field, opened in the 1930's in the sparsely settled steppes, provides good-quality coking coal

Map drawn by Vincent Kotschar

(though high in ash) and is closer to the Magnitogorsk steel industry than the faraway Kuznetsk.

One of the major problems of Soviet metallurgy is a shortage of good-quality coking coal. Much of the coking coal used is high in sulphur and in ash; recovery of coke per ton of coking coal is slightly more than 50 per cent, as compared with 76 per cent in the United States. Another problem is the fact that much of the Donets coal lies in thin seams, few of them are more than a yard thick; extraction costs are therefore high, and are likely to keep on rising.

Estimates of the Soviet share of total world reserves of petroleum range from 5 per cent according to *World Oil* to 59 per cent according to Soviet sources. Suffice it to say that geological conditions from the Caspian Sea northward to the Urals are favorable for

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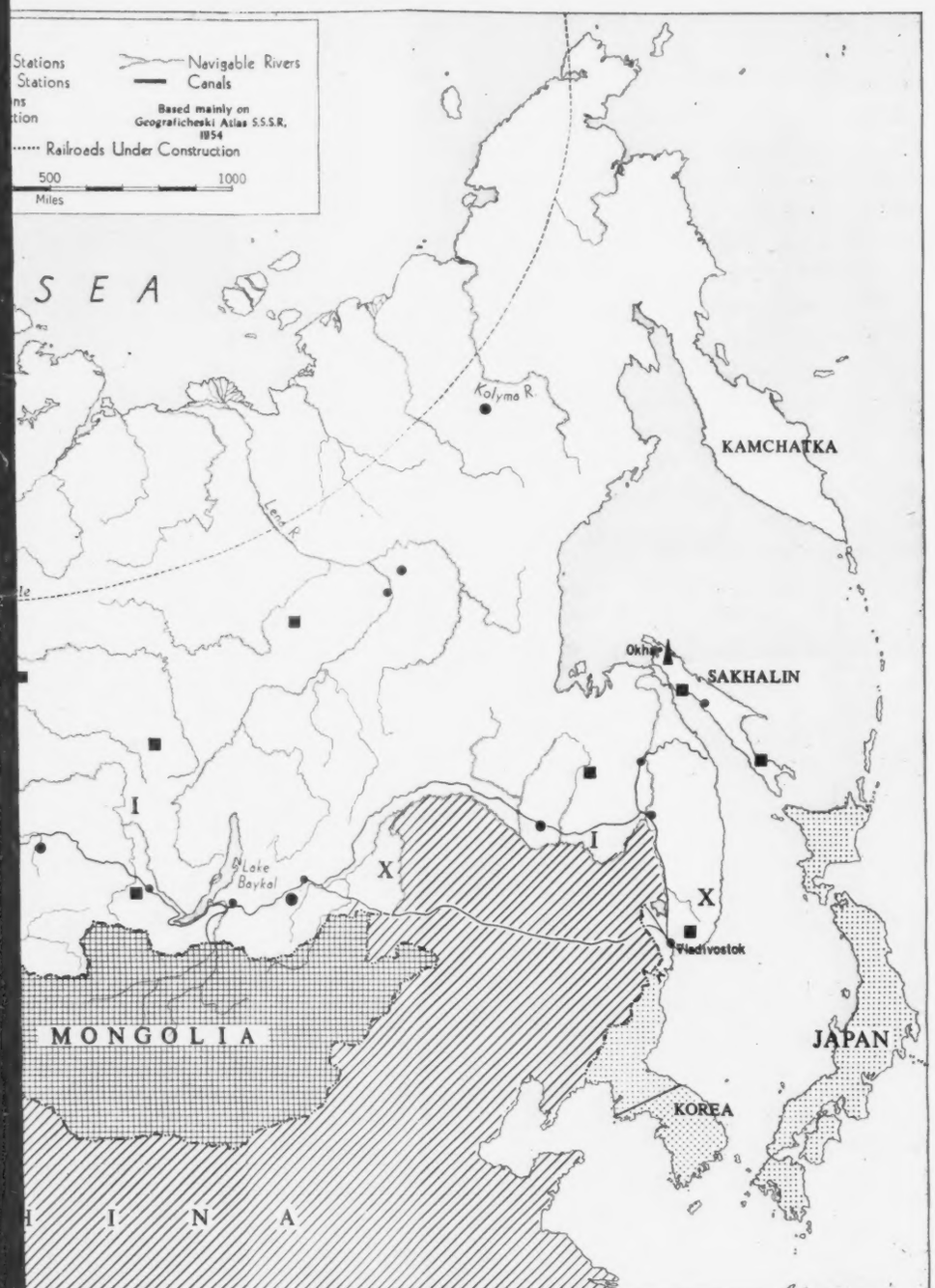

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large deposits of petroleum; undoubtedly, new oil fields will be discovered and exploited.

At the moment, however, the relative importance of petroleum in the Soviet Union is declining; coal is becoming the principal industrial fuel. Fifty years ago the amount of fuel obtained from petroleum equaled that from coal; by 1950 it had fallen to less than one-quarter as much, indicating a trend in direct opposition to that of the United States, where petroleum and natural gas are being increasingly used in place of coal.

Furthermore, nothing comparable to the dramatic discovery and exploitation of the oil fields in America and along the Persian Gulf has taken place in the Soviet Union in the last few decades, and consequently it has not been able to maintain its former rank among world producers. In 1901 the Soviet Union was producing half of the world's petroleum; by 1946 its share had dropped to 6 per cent. In 1953, when it produced 52 million metric tons (330 million barrels), its share had risen to only 8 per cent, in spite of the emergence of the *Second* Baku.

Although never in enemy hands during World War II, the old Baku, for long the world's leading oil field, declined during the war owing to a shortage of labor and materials, especially steel needed for new drilling. It has never fully recovered because several of the early-developed pools have been exhausted. Such fields as Grozny and Maikop have also declined, for similar reasons, and are now only moderately productive, as are the fields of Nebit-Day and Emba on the Caspian Sea, and Okha on Sakhalin.

As a result of the discovery of good oil horizons at greater depths, the Second Baku (really an umbrella name for three widely spaced districts) has been growing rapidly; in fact, it is now the largest Soviet producer. The three oil districts are located near the cities of Ufa and Molotov on the western flank of the

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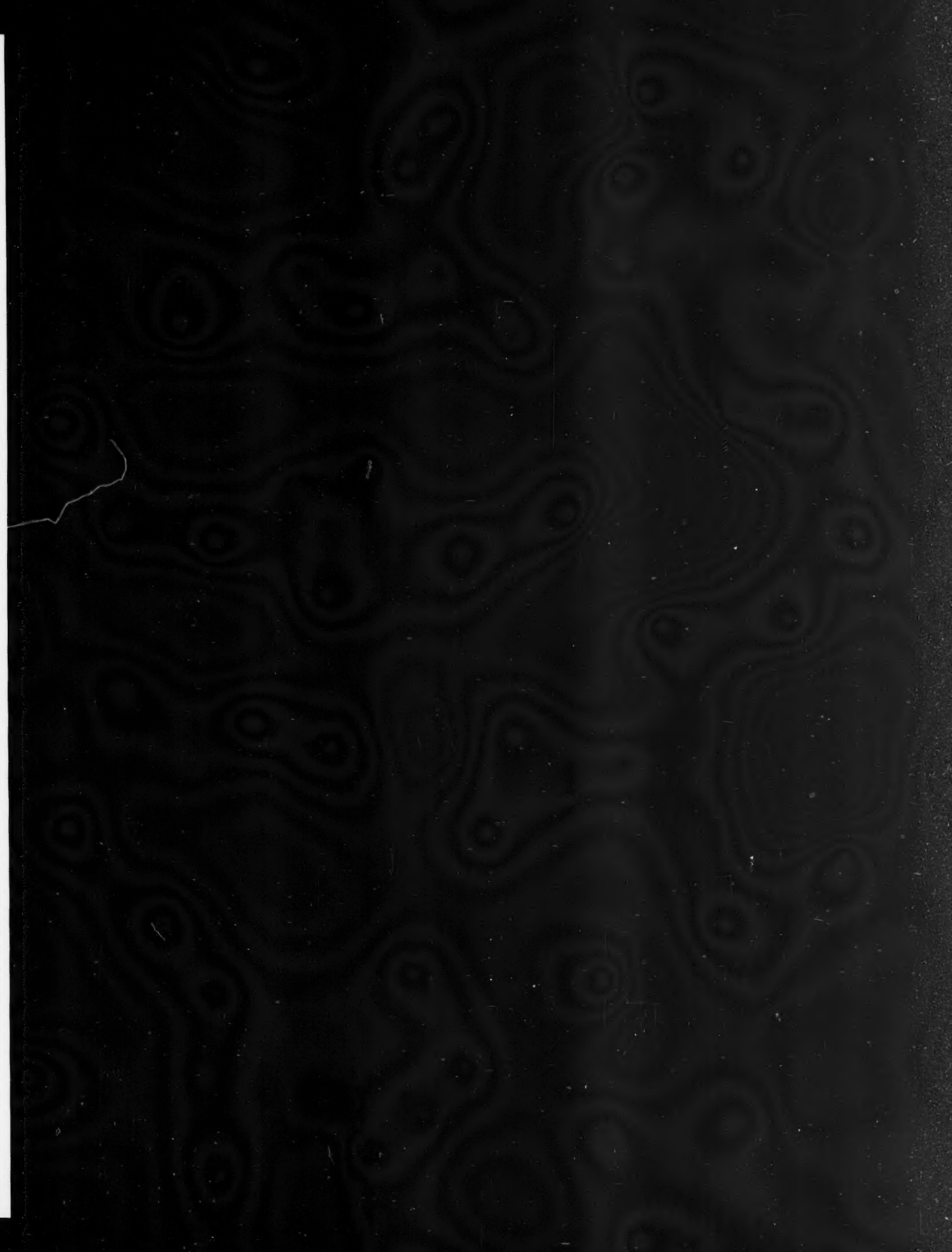

Ural Mountains, and Kuibyshev, on the Volga River.

Several of the longest and largest rivers in the world cross the Soviet Union, yet its water-power resources are less developed than those of any other major power: only about 3 per cent of the potential is utilized. The Fourth Five-Year Plan called for the production of 12 billion kw-h in 1950 from hydroelectric plants. Great projects now under way at Kuibyshev and Stalingrad on the Volga, and elsewhere, are expected nearly to triple hydroelectric-power production, but even then it will lag far behind that of the United States (96 billion kw-h in 1950), or of Western Europe, or of Canada. The failure to push the development of hydroelectric power in the Soviet Union is a direct result of the highly unfavorable areal distribution of water-power resources (which are mainly in eastern Siberia thousands of miles from the large population centers), and the great seasonal variations in flow in the rivers (many are subject to tremendous floods after spring thaws; many are frozen for months at a stretch) coupled with the heavy costs required for hydroelectric-power installations.

Turning now from energy to metals, let us consider the Soviet Union's position with respect to iron, copper, aluminum, lead, and zinc—the principal metalliferous ores of industrial significance. Very few countries have large reserves of all these ores, and most countries import a fraction of their needs for one or more of them. The Soviet Union, however, is driving for self-sufficiency in all strategic materials.

The measured reserves of iron ore that could be utilized under existing technological and economic conditions are sufficient to last for about a century at current rates of consumption. About two-thirds of these reserves are found in three major deposits: Krivoy Rog, Kerch, and Magnitogorsk. The most pressing problem with respect to iron ore in the Soviet Union, as it is in the Mesabi Range of the United States, is the approaching exhaustion of high-grade ore and the consequent necessity of turning to lower-quality ores that require concentration before use. The little-used Kerch ores, the largest measured reserve, average only 35 per cent iron content; they are powdery and must be sintered as well as concentrated. Both Krivoy Rog and Magnitogorsk, by far the largest producers of high-quality iron ore, are reported to be approaching depletion of the best ores.

The Soviet Union has moderate reserves of copper ore, thought to be enough to last several decades at present rates of production. Like American copper deposits, the two principal deposits, at Dzhezkazgan and Kounradski, have a low copper content and are remote from markets. Probably because of technological difficulties the Soviet Union has regularly had

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